UNIVERSITY OF JOHANNESBURG

PROGRAM : NATIONAL DIPLOMA

ENVIRONMENTAL HEALTH

SUBJECT : ENVIRONMENTAL POLLUTION II

WASTE, WATER AND SANITATION

CODE: ENP 21-1

DATE : JANUARY 2018

SUPPLEMENTARY EXAMINATION

DURATION: 3 HOURS

TOTAL MARKS: 150

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MODERATOR : MS C MOKOATLE 4075

NUMBER OF PAGES : 6 PAGES

INSTRUCTIONS TO STUDENTS:

1. Answers all the questions, answer all questions in the appropriate format and number accordingly.
2. Read your questions carefully. You will be penalized if your answers are not properly structured. Please write legible.
3. You can start with any question, but do not divide sub-questions of the same question.
4. Please answer **Section A** in **Book 1** and **Section B** in **Book 2**.
5. Most importantly, have fun with your answers.

BACKGROUND FOR YOUR EXAMINATION

The recent in-depth analysis of the General Household Survey 2002–2015 and Community Survey 2016 data published by Statistics South Africa showed that although we as a country have taken great strides towards achieving the Millennium Development Goals, a lot of work is still required to meet the Sustainable Developmental Goals. Of specific interest for this course is Goal 6 looking at Clean Water and Sanitation (SDG) provided to communities. The setting for your exam is outlined in Figure 1 below and represents the typical community setup we find in South Africa. These include rural area, informal settlements, urban areas, industrial and agricultural activities.

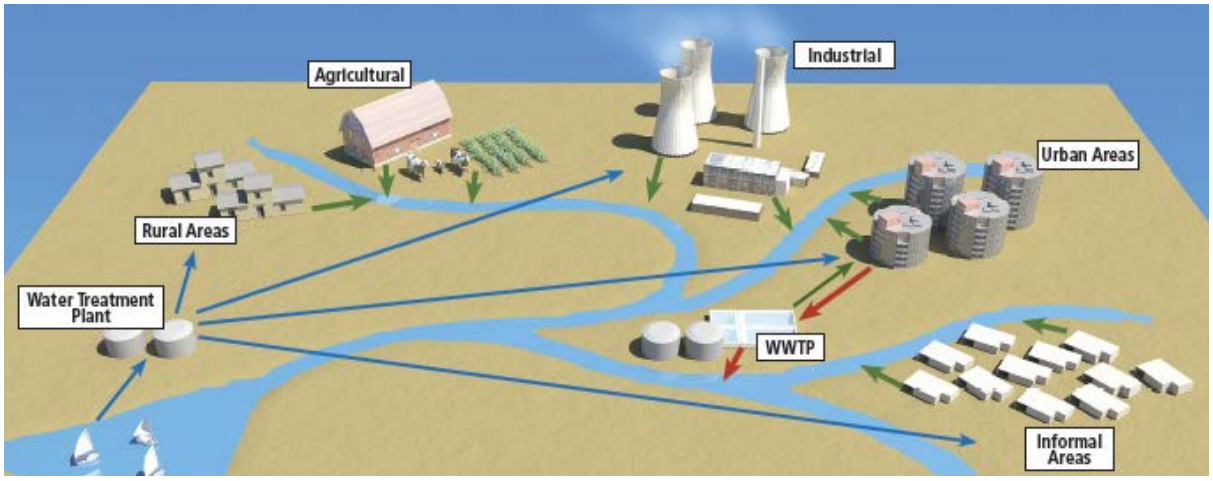

Figure 1 A representation of the typical communities found in South Africa and how they interact with water and wastewater service.

Your examination will be based on interpreting information presented related to Figure 1 asking your explanation, interpretation or solution as indicated in each question.

SECTION A: WATER, WASTEWATER AND HYGIENE

Question 1: Water (42 marks)

1.1 Providing water to our communities requires that the water be treated to be deemed safe for human consumption. Using a flow diagram illustrate the typical steps involved in the treatment of dam or river water. (4 marks)

1.2 When diarrheal outbreaks occur the first culprit blamed is usually water. You as Environmental Health Practitioner must investigate if this is truly the case and determine what is the cause? Use a detailed flowchart to illustrate the steps and when the local Department of Health and an epidemiologist should be involved. (6 marks)

1.3 Providing consumers access to potable water within a short distance from their homes is one of the SGD's. Despite our best efforts there still are situations where this is not possible. Name and explain two risk factors associated with the water you can identify from the pictures below that could influence the health of the users. (4 marks)

a) 

b) 

1.4 When potable water is not available consumers can be advised to treat their own water. In general, all treatment processes can be divided into four groups or types for point-of-use water treatment. Name the four groups of processes. (4 marks)

1.5 Sand filtration is an example of one of these processes that can be used on industrial or household scale to filter water through a layer of sand in a specifically constructed container. Name and discuss the two types of sand filtration that we can apply to the treatment of water. (6 marks)

1.6 You are invited to an outbreak in a community that use river water for drinking purposes. The people are complaining of an increase of acute diarrhea in the last few days.

1.6.1 How would you define acute diarrhea? (1 marks)

1.6.2 How would you go about sampling the river to determine the bacteriological quality of the water? (6 marks)

1.6.3 Draw a sample label and add all the information you would be required to add to the label. (5 marks)

1.6.4 You determine the water is very turbid and that *E. coli* is present in the water. You notice a few things around the home that can be used to treat the water. Describe how you would treat the water to produce clear potable water that can be safely stored. What did you use in the house to achieve this? (6 marks)

Question 2: Wastewater (10 marks)

The creation of waste is serious concern, especially since when it contaminates our water resources.

2.1 How would you describe wastewater? (2 marks)

2.2 Using a flow diagram give the wastewater treatment processes and order for the treatment of human fecal waste in urban settings. (4 marks)

2.3 Treatment of human fecal waste in rural areas may be challenging due to lack of infrastructure. In such cases a package plant may be a useful alternative. Briefly describe the advantages of a package treatment plant. (2 marks)

2.4 In recent years researchers started looking at the use of wastewater treatment by-products for commercial gains. Name two possible by-products that could be utilized from the treatment wastewater containing human fecal waste. (2 marks)

Question 3: Hygiene (18 marks)

3.1 Water is always blamed for outbreaks but in certain cases can be the cause of water related diseases. In the following example, we are expecting two types of water related disease problems. Name and describe, with examples, why these water related diseases may occur, how it is spread and what type of micro-organism is typically involved.

3.1.1 The first is an informal settlement in the Western Cape currently undergoing drastic water restrictions. The citizens are limited to 50 l water per person and as a result people are not washing as often as they use too. (5 marks)

3.1.2 The second is a town with leaks in both the sewer and water pipes resulting in untreated sewage entering the treated water. (5 marks)

3.2 Most water and sanitation related diseases typically get transmitted via 5 components. Using a diagram illustrate the possible routes for how the diseases can be transmitted. (5 marks)

3.3 Typically, the outcome of water and sanitation related diseases is diarrhea. Name four types of diarrhea a patient could present with. (4x½=2 marks)

3.4 As we better our water and sanitation service delivery, we must never forget the impact of hygiene. In your opinion, can toys be a route of transmission for disease? (1 mark)

SECTION B: SANITATION AND WASTE

Question 4: Sanitation (40 Marks)

4. The dawn of democracy in 1994 created a new dispensation in which access to basic services such as housing, water and sanitation was recognized as a fundamental human right. South Africa inherited high levels of poverty and it continues to be confronted with unequal and often inadequate access to resources, infrastructure and social services.

4.1 Explain the constitutional right of people living in rural communities in terms of sanitation. (5 marks)

4.2 Provide the full names of 4 main Sanitation Policy documents that provides a framework for sanitation service delivery in South Africa. (4 marks)

4.3 Would rural communities qualify for Free Basic Sanitation? Motivate your answer. (5 marks)

4.4 What would your role as an Environmental Health Practitioner be in urban sanitation planning? (5 marks)

4.5 Define the relationship between IDP and WSDP. (Write abbreviations in full) (5 marks)

4.6 Explain how the abovementioned can be used effectively to promote planning for sanitation rural areas? (6 marks)

4.7 Limited access to water is one of the challenges most rural communities face on a daily basis. Identify the most appropriate technology option, which would be most suitable for rural communities. Then describe the technology choice in terms of the following

4.7.1 Health and hygiene (2 marks)

4.7.2 Environment (2 marks)

4.7.3 Functions (2 marks)

4.7.4 Cost (2 marks)

4.7.5 Maintenance (2 marks)

Question 5: Waste Management (40 Marks)

5. You are appointed as an Environmental Health Practitioner in a fast developing rural town, responsible for waste management and how it affects the health of the community and the environment.

5.1 Define the concept general waste. (5 marks)

5.2 General waste does not require classification or assessment, list and describe 5 examples. (5 marks)

5.3 Waste Activities that do not require a Waste Management License (6 marks)

5.4 Briefly discuss the class of landfill appropriate for the disposal of general waste. (4 marks)

5.5 Describe by illustration the standard containment barrier requirements (engineering design requirements) for general waste. (5 marks)

5.6 Explain the significance of appropriate management of the following types of waste to EHPs and make relevant examples.

5.6.1 Agricultural Waste (5 marks)

5.6.2 Commercial Waste (5 marks)

5.6.3 Municipal Waste (5 marks)

Total Marks = 150